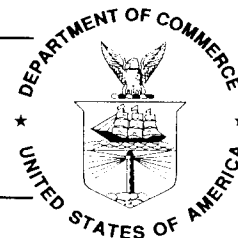


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CALIBRATION LABORATORIES

NVLAP LAB CODE 105000-0

OAK RIDGE METROLOGY CENTER

P.O. Box 2009
Oak Ridge, TN 37831-7670
W. T. (Bill) McKeethan
Phone: 423-574-2707 Fax: 423-574-2802
E-Mail: wmt.ornl.gov
URL: <http://www.ornl.gov/orcmt.mfgqual>

DIMENSIONAL

NVLAP Code: 20/D03
Gage Blocks, Steel Only

| Range | Best Uncertainty (\pm) ^{note 1} | Remarks |
|----------------|---|-----------------------|
| 0.010 to 0.090 | 2.4 μ in | Mechanical Comparison |
| 0.01 to 1.000 | 1.8 μ in | Mechanical Comparison |
| 2.0 to 4.0 | 2 μ in + 0.8 x 10 ⁻⁶ ; L is length in inches | Mechanical Comparison |

NVLAP Code: 20/D05
Length

| Range | Best Uncertainty (\pm) ^{note 1} | Remarks |
|------------|---|--|
| 0 - 1.35 m | (0.3 + 0.4L) micrometers; L is length in meters | Step and End Gages using M-60 Coordinate Measuring Machine |
| 0 - 1.2 m | (0.3 + 0.4L) micrometers; L is length in meters | Step and End Gages using M-48 Coordinate Measuring Machine |

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Grid Plates

| <i>Range</i> | <i>Best Uncertainty (\pm)^{note 1}</i> | <i>Remarks</i> |
|-----------------|--|----------------|
| 600 mm x 800 mm | 0.6 μm + 0.45 L μm ; L is length in meters | CMM (optical) |

NVLAP Code: 20/D18

Gears

| <i>Range</i> | <i>Best Uncertainty (\pm)^{note 1}</i> | <i>Remarks</i> |
|----------------------------------|---|------------------|
| to 6" Diameter | 0.9 μm | Involute Profile |
| to 6" Diameter and Infinite Lead | 0.8 μm | Tooth Alignment |
| to 6" Diameter and 99" Lead | 0.9 μm | Tooth Alignment |
| to 6" Diameter and 32" Lead | 1.1 μm | Tooth Alignment |
| to 6" Diameter and 16" Lead | 1.2 μm | Tooth Alignment |
| to 6" Diameter and 11" Lead | 1.4 μm | Tooth Alignment |
| to 6" Diameter (pin offset) | 0.7 μm | Pin Master |
| to 6" Diameter (pin diameter) | 0.5 μm | Pin Master |
| to 6" Diameter (pin roundness) | 0.3 μm | Pin Master |

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TIME AND FREQUENCY

NVLAP Code: 20/F01

Frequency Dissemination

| <i>Range</i> | <i>Best Uncertainty (\pm) in Hz^{note 1}</i> | <i>Remarks</i> |
|----------------------|---|----------------------|
| 1 MHz, 5 MHz, 10 MHz | 1.01×10^{-10} | Comparison using FMS |
| 1 MHz, 5 MHz, 10 MHz | 5.3×10^{-10} | Comparison |
| 1 Hz to < 1 MHz | $(1 \times 10^{-6} + 0.1 \text{ Hz})^{\text{note 2}}$ | Direct Reading |
| 1 MHz to 10 MHz | $1 \times 10^{-8}^{\text{note 2}}$ | Direct Reading |
| > 10 MHz to 1 GHz | $1 \times 10^{-7}^{\text{note 2}}$ | Direct Reading |

MECHANICAL

NVLAP Code: 20/M08

Mass

| <i>Range</i> | <i>Best Uncertainty (\pm)^{note 1}</i> | <i>Remarks</i> |
|--------------|---|----------------|
| 30 kg | 95 mg | |
| 20 kg | 41 mg | |
| 10 kg | 19.4 mg | |

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| | |
|--------|---------|
| 5 kg | 14.5 mg |
| 2 kg | 13.0 mg |
| 1 kg | 1.31 mg |
| 500 g | 0.66 mg |
| 200 g | 0.29 |
| 100 g | 0.136 |
| 50 g | 0.072 |
| 20 g | 0.038 |
| 10 g | 0.029 |
| 5 g | 0.0083 |
| 2 g | 0.0052 |
| 1 g | 0.0052 |
| 500 mg | 0.0040 |
| 200 mg | 0.0037 |
| 100 mg | 0.0036 |
| 50 mg | 0.0036 |
| 20 mg | 0.0036 |
| 10 mg | 0.0036 |

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| | |
|------|--------|
| 5 mg | 0.0036 |
| 2 mg | 0.0036 |
| 1 mg | 0.0036 |

THERMODYNAMICS

NVLAP Code: 20/T07

Resistance Temperature Devices

| <i>Range</i> | <i>Best Uncertainty (\pm)^{note 1}</i> | <i>Remarks</i> |
|-----------------------|---|----------------|
| 0.01 °C to 29.7646 °C | 0.001 °C | Comparison |

1. Represents an expanded uncertainty using a coverage factor, $k=2$
2. Realizable uncertainty depends on frequency being measured, customer requirements, and suitability of customer's equipment.

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